What is claimed is:

1. A valve actuator, comprising:

a lower actuator housing having a bore extending therethrough;

an actuator cylinder housing having a counterbore extending therein, said actuator cylinder housing secured in sealing engagement to a first end of said lower actuator housing;

a lower actuator plate having bore extending therethrough, said lower actuator plate secured to a second end of said lower actuator housing;

a helix sleeve secured within said lower actuator housing bore and sealed therein, said helix sleeve having a plurality of helical slots formed in the wall of said helix sleeve, said helix sleeve including a reduced diameter bore on one end;

said actuator cylinder housing including a bore axially coincident with said counterbore and formed on the end of said actuator cylinder housing opposite to said lower actuator housing;

an actuator drive shaft, said actuator drive shaft extending between said actuator cylinder housing bore and said reduced diameter bore of said helix sleeve and sealed within said bores and axially restrained therebetween;

an actuator piston sleeve sealingly disposed in the annulus between said actuator drive shaft and said counterbore of said actuator cylinder housing, said actuator piston sleeve axially moveable within said counterbore of said actuator cylinder housing in response to hydraulic pressure;

said actuator piston sleeve having a reduced diameter portion extending into the annulus between said actuator drive shaft and said helix sleeve, said reduced diameter portion of said actuator piston sleeve sealing on said actuator drive shaft, said reduced diameter portion of said actuator piston sleeve having a plurality of axially disposed slots formed therein; and,

a first actuation means secured to said reduced diameter portion of said actuator piston sleeve and engaging said helical slots in said helix sleeve and a second actuation means secured to said actuator drive shaft and engaging said axially disposed slots in said reduced diameter portion of said actuator piston sleeve whereby reciprocation of said actuator piston sleeve causes rotation of said actuator drive shaft.

2. A valve actuator, according to Claim 1, wherein:

said helix sleeve is axially restrained between said actuator cylinder housing and said lower actuator plate.

3. A valve actuator, according to Claim 2, wherein:

said helix sleeve is rotationally restrained by first securing means extending between said helix sleeve and said lower actuator plate and second securing means extending between said helix sleeve and said lower actuator housing.

4. A valve actuator, according to Claim 3, wherein:

a first end of said actuator drive shaft seals within said bore of said actuator cylinder housing and a second end of said actuator drive shaft seals within said reduced diameter bore of said helix sleeve.

5. A valve actuator, according to Claim 4, wherein:

said first end of said actuator drive shaft extends beyond said bore of said actuator cylinder housing; and,

said first end of said actuator drive shaft has indicator means formed thereon to indicate the rotational position of said actuator drive shaft.

6. A valve actuator, according to Claim 5, wherein:

said second end of said actuator drive shaft extends beyond said reduced diameter bore of said helix sleeve and through said bore of said lower actuator plate; and,

said second end of said actuator drive shaft includes an engaging means formed thereon for engaging a valve closure adapter which engages a stem of a valve to be operated by said actuator.

7. A valve actuator, according to Claim 6, wherein:

said first and second actuation means are a plurality of rollers.

8. A valve actuator, according to Claim 7, wherein:

said first and second securing means rotationally restraining said helix sleeve are a plurality of anti-rotation pins.

9. A valve actuator, according to Claim 8, wherein:

said engaging means formed on said second end of said actuator drive shaft is a spline.

10. A valve actuator, according to Claim 1, wherein:

said plurality of helical slots formed in the wall of said helix sleeve have a constant helix angle.

11. A valve actuator, according to Claim 1, wherein:

said plurality of helical slots formed in the wall of said helix sleeve have a variable helix angle.

12. A hydraulic control system for a valve actuator, comprising:

first and second control valves, said first and second control valves controlling operation of a valve actuator;

said first and second control valves including inlet and outlet ports fluidly connected, said inlet ports of said first and second control valves connected to a fluid pressure source, said first and second control valves including a vent port and a manually operated flow control member biased to a closed position preventing fluid flow between said inlet and outlet ports and allowing fluid flow between said outlet and vent ports;

first through fourth pilot operated valves containing inlet and outlet ports fluidly connected, fluid flow between said inlet and outlet ports controlled by a pilot pressure port operated flow control member, said flow control member biased to a closed position;

said pilot pressure port of said first pilot operated valve connected to said outlet port of said first control valve, said inlet port of said first pilot operated valve connected to said fluid pressure source, said outlet port connected to a first actuator fluid supply tank;

said first actuator fluid supply tank fluidly connected to said actuator whereby pressurized fluid from said first actuator fluid supply tank urges said actuator to a valve closed position;

said outlet port of said first pilot operated valve connected to said inlet port of said second pilot operated valve, said outlet port of said second pilot operated valve connected to an exhaust orifice valve;

said pilot pressure port of said third pilot operated valve connected to said outlet port of said second control valve, said inlet port of said third pilot operated valve connected to said fluid pressure source, said outlet port connected to a second actuator fluid supply tank;

said second actuator fluid supply tank fluidly connected to said actuator whereby

pressurized fluid from said second actuator fluid supply tank urges said actuator to a valve open position;

said outlet port of said third pilot operated valve connected to said inlet port of said fourth pilot operated valve, said outlet port of said fourth pilot operated valve connected to said exhaust orifice valve;

said first and second actuator fluid supply tanks fluidly connected through a normally open valve controlled by a pair of pilot ports, said pair of pilot ports connected to said outlet ports of said control valves, respectively, and;

said outlet port of said first pilot operated valve connected to said inlet port of said second pilot operated valve connected also to said pilot port of said third pilot operated valve, and said outlet port of said third pilot operated valve connected to said inlet port of said fourth pilot operated valve connected also to said pilot port of said second pilot operated valve.

13. A hydraulic control system for a valve actuator, according to claim 12, wherein:

said fluid pressure source is a gas pressurized pipeline through which said valve and valve actuator control flow.

14. A hydraulic control system for a valve actuator, according to claim 13, wherein:

said normally open valve connected between said first and second actuator fluid supply tanks is an orifice valve.

15. A hydraulic control system for a valve actuator, according to claim 14, wherein:

said orifice valve allowing equalization of pressure between said first and second actuator fluid supply tanks after said first and second control valves are moved to said closed position; and,

said equalized pressure between said first and second actuator fluid supply tanks is bled to atmospheric pressure through said exhaust orifice valve.

16. A hydraulic control system for a valve actuator, according to claim 15, wherein:

said pressurized fluid supplied by said fluid pressure source is a gas.

17. A hydraulic control system for a valve actuator, according to claim 16, wherein:

said pressurized fluid supplied by said first and second actuator fluid supply tanks to said actuator is oil; and,

said oil being pressurized by said gas from said fluid pressure source.

18. A hydraulic control system for a valve actuator, according to claim 17, wherein: each of said first and second fluid actuator tanks includes a manually operated pump, said pumps operable to supply pressurized fluid to said actuator to operate said actuator between open and closed positions.

19. A hydraulic control system for a valve actuator, according to claim 18, wherein: said pumps are disposed on said actuator tanks.

20. A hydraulic control system for a valve actuator, according to claim 19, wherein: said pumps include a shuttle valve to allow operation of said pumps independently of said first and second control valves.

21. A hydraulic control system for a valve actuator, comprising:

(a) first and second control circuits, said first control circuit operating a valve actuator to close a valve secured to said valve actuator and said second control circuit operating said valve actuator to open said valve secured to said valve actuator;

(b) a fluid pressure source;

(c) an exhaust valve;

(d) said valve closing first control circuit including:

(*i*) a control valve having a manually operated flow control member biased to a closed position preventing fluid flow between inlet and outlet ports and allowing fluid flow between said outlet and a vent port and said inlet port connected to said fluid pressure source;

(*ii*) first and second pilot operated valves containing a pilot pressure port operated flow control member, biased to a closed position, controlling fluid flow between inlet and outlet ports;

(*iii*) an actuator close fluid supply tank fluidly connected to said actuator whereby pressurized fluid from said actuator close fluid supply tank urges said actuator to a valve closed position;

(e) said valve opening second control circuit including:

(*i*) a control valve having a manually operated flow control member biased to a closed position preventing fluid flow between inlet and outlet ports and allowing fluid flow between said outlet and a vent port and said inlet port connected to said fluid pressure source;

(*ii*) third and fourth pilot operated valves containing a pilot pressure port operated flow control member, biased to a closed position, controlling fluid flow between inlet and outlet ports;

(*iii*) an actuator open fluid supply tank fluidly connected to said actuator whereby pressurized fluid from said actuator open fluid supply tank urges said actuator to a valve open position;

(f) a pilot operated normally open valve controlled by a pair of pilot ports allowing fluid communication between said actuator open fluid supply tank and said actuator close fluid supply tank, one of each of said pair of pilot ports connected to said first and second control circuits;

(g) said fluid pressure source connected to said inlet ports of said control valve and said first pilot operated valve of each of said first and second control circuits;

(h) each of said first and second fluid actuator tanks includes a manually operated pump, said pumps operable to supply pressurized fluid to said actuator to operate said actuator between open and closed positions;

said pumps include a shuttle valve to allow operation of said pumps independently of said first and second control circuits;

wherein:

(i) operation of said first control circuit control valve to an open position;

(*i*) directs fluid pressure to said pilot operated normally open valve to equalize pressure between said actuator open fluid supply tank and said actuator close fluid supply tank;

(*ii*) directs fluid pressure from said outlet port of said first control circuit control valve to said pilot port of said first pilot operated valve of said valve closing first control circuit to operate said first pilot operated valve and allow fluid pressure to pressurize said actuator close fluid supply tank and supply pressurized fluid to said actuator to close said valve; and,

(*iii*) directs fluid pressure from said outlet port of said first pilot operated valve of said first control circuit to said pilot port of said fourth pilot operated valve of said valve opening second control circuit to operate said fourth pilot operated valve and vent pressure from said actuator open fluid supply tank through said exhaust

orifice valve;

(j) operation of said second control circuit control valve to an open position;

(*i*) directs fluid pressure to said pilot operated normally open valve to equalize pressure between said actuator open fluid supply tank and said actuator close fluid supply tank;

(*ii*) directs fluid pressure from said outlet port of said second control circuit control valve to said pilot port of said third pilot operated valve of said valve opening second control circuit to operate said third pilot operated valve and allow fluid pressure to pressurize said actuator open fluid supply tank and supply pressurized fluid to said actuator to open said valve;

(*iii*) directs fluid pressure from said outlet port of said third pilot operated valve of said second control circuit to said pilot port of said second pilot operated valve of said valve closing first control circuit to operate said second pilot operated valve and vent pressure from said actuator close fluid supply tank through said exhaust orifice valve;

(k) operation of said manually operated pump on said actuator close fluid supply tank;

(*i*) directs fluid pressure to close said actuator; and,

(l) operation of said manually operated pump on said actuator open fluid supply tank;

(*i*) directs fluid pressure to open said actuator.

22. A hydraulic control system for a valve actuator, according to claim 21, wherein:

said orifice valve allowing equalization of pressure between said first and second actuator fluid supply tanks after said first and second control valves are moved to said closed position; and,

said equalized pressure between said first and second actuator fluid supply tanks is bled to atmospheric pressure through said exhaust orifice valve.

23. A hydraulic control system for a valve actuator, according to claim 22, wherein:

said pressurized fluid supplied by said fluid pressure source is a gas.

24. A hydraulic control system for a valve actuator, according to claim 23, wherein:

said pressurized fluid supplied by said first and second actuator fluid supply tanks to

said actuator is oil; and,

said oil being pressurized by said gas from said fluid pressure source.

25. A system for controlling fluid flow through a pipeline, comprising:

(A) a valve, said valve installed in a pipeline to selectively control fluid flow through said pipeline;

(B) an actuator attached to said valve, said actuator operating said valve between open and closed positions;

(C) a hydraulic control system, said hydraulic control system controlling operation of said actuator;

(D) said actuator comprising:

(a) a lower actuator housing having a bore extending therethrough;

(b) an actuator cylinder housing having a counterbore extending therein, said actuator cylinder housing secured in sealing engagement to a first end of said lower actuator housing;

(c) a lower actuator plate having bore extending therethrough, said lower actuator plate secured to a second end of said lower actuator housing;

(d) a helix sleeve secured within said lower actuator housing bore and sealed therein, said helix sleeve having a plurality of helical slots formed in the wall of said helix sleeve, said helix sleeve including a reduced diameter bore on one end;

(e) said actuator cylinder housing including a bore axially coincident with said counterbore and formed on the end of said actuator cylinder housing opposite to said lower actuator housing;

(f) an actuator drive shaft, said actuator drive shaft extending between said actuator cylinder housing bore and said reduced diameter bore of said helix sleeve and sealed within said bores and axially restrained therebetween;

(g) an actuator piston sleeve sealingly disposed in the annulus between said actuator drive shaft and said counterbore of said actuator cylinder housing, said actuator piston sleeve axially moveable within said counterbore of said actuator cylinder housing in response to hydraulic pressure;

(h) said actuator piston sleeve having a reduced diameter portion extending into

the annulus between said actuator drive shaft and said helix sleeve, said reduced diameter portion of said actuator piston sleeve sealing on said actuator drive shaft, said reduced diameter portion of said actuator piston sleeve having a plurality of axially disposed slots formed therein; and,

(i) a first actuation means secured to said reduced diameter portion of said actuator piston sleeve and engaging said helical slots in said helix sleeve and a second actuation means secured to said actuator drive shaft and engaging said axially disposed slots in said reduced diameter portion of said actuator piston sleeve whereby reciprocation of said actuator piston sleeve causes rotation of said actuator drive shaft;

(E) said hydraulic control system comprising:

(a) first and second control valves, said first and second control valves controlling operation of a valve actuator;

(b) said first and second control valves including inlet and outlet ports fluidly connected, said inlet ports of said first and second control valves connected to a fluid pressure source, said first and second control valves including a vent port and a manually operated flow control member biased to a closed position preventing fluid flow between said inlet and outlet ports and allowing fluid flow between said outlet and vent ports;

(c) first through fourth pilot operated valves containing inlet and outlet ports fluidly connected, fluid flow between said inlet and outlet ports controlled by a pilot pressure port operated flow control member, said flow control member biased to a closed position;

(d) said pilot pressure port of said first pilot operated valve connected to said outlet port of said first control valve, said inlet port of said first pilot operated valve connected to said fluid pressure source, said outlet port connected to a first actuator fluid supply tank;

(e) said first actuator fluid supply tank fluidly connected to said actuator whereby pressurized fluid from said first actuator fluid supply tank urges said actuator to a valve closed position;

(f) said outlet port of said first pilot operated valve connected to said inlet port of

said second pilot operated valve, said outlet port of said second pilot operated valve connected to an exhaust orifice valve;

(g) said pilot pressure port of said third pilot operated valve connected to said outlet port of said second control valve, said inlet port of said third pilot operated valve connected to said fluid pressure source, said outlet port connected to a second actuator fluid supply tank;

(h) said second actuator fluid supply tank fluidly connected to said actuator whereby pressurized fluid from said second actuator fluid supply tank urges said actuator to a valve open position;

(i) said outlet port of said third pilot operated valve connected to said inlet port of said fourth pilot operated valve, said outlet port of said fourth pilot operated valve connected to said exhaust orifice valve;

(j) said first and second actuator fluid supply tanks fluidly connected through a normally open valve controlled by a pair of pilot ports, said pair of pilot ports connected to said outlet ports of said control valves, respectively, and;

(k) said outlet port of said first pilot operated valve connected to said inlet port of said second pilot operated valve connected also to said pilot port of said third pilot operated valve, and said outlet port of said third pilot operated valve connected to said inlet port of said fourth pilot operated valve connected also to said pilot port of said second pilot operated valve, and;

(l) each of said first and second fluid actuator tanks includes a manually operated pump, said pumps operable to supply pressurized fluid to said actuator to operate said actuator between open and closed positions.

26. A system for controlling fluid flow through a pipeline, according to Claim 25, wherein:

said helix sleeve is axially restrained between said actuator cylinder housing and said lower actuator plate;

said helix sleeve is rotationally restrained by first securing means extending between said helix sleeve and said lower actuator plate and second securing means extending between said helix sleeve and said lower actuator housing; and,

said fluid pressure source is a pressurized pipeline through which said valve and

valve actuator control flow.

27. A system for controlling fluid flow through a pipeline, according to Claim 26, wherein:

a first end of said actuator drive shaft seals within said bore of said actuator cylinder housing and a second end of said actuator drive shaft seals within said reduced diameter bore of said helix sleeve; and,

said normally open valve connected between said first and second actuator fluid supply tanks is an orifice valve allowing equalization of pressure between said first and second actuator fluid supply tanks after said first and second control valves are moved to said closed position;

said equalized pressure between said first and second actuator fluid supply tanks is bled to atmospheric pressure through said exhaust orifice valve; and,

said pumps are disposed on said actuator tanks.

28. A system for controlling fluid flow through a pipeline, according to Claim 27, wherein:

said second end of said actuator drive shaft extends beyond said reduced diameter bore of said helix sleeve and through said bore of said lower actuator plate;

said second end of said actuator drive shaft includes an engaging means formed thereon for engaging a valve closure adapter which engages a stem of a valve to be operated by said actuator;

said pressurized fluid supplied by said fluid pressure source is a gas; and,

said pumps include a shuttle valve to allow operation of said pumps independently of said first and second control valves.

29. A system for controlling fluid flow through a pipeline, according to Claim 28, wherein:

said first and second actuation means are a plurality of rollers;

said pressurized fluid supplied by said first and second actuator fluid supply tanks to said actuator is oil; and,

said oil being pressurized by said gas from said fluid pressure source.

30. A system for controlling fluid flow through a pipeline, according to Claim 29, wherein:

said first and second securing means rotationally restraining said helix sleeve are a plurality of anti-rotation pins.

31. A system for controlling fluid flow through a pipeline, according to Claim 30, wherein:

said engaging means formed on said second end of said actuator drive shaft is a spline.

32. A system for controlling fluid flow through a pipeline, according to Claim 31, wherein:

said plurality of helical slots formed in the wall of said helix sleeve have a constant helix angle.

33. A system for controlling fluid flow through a pipeline, according to Claim 32, wherein:

said plurality of helical slots formed in the wall of said helix sleeve have a variable helix angle.